AIRS Data Assimilation Workshop

Overview

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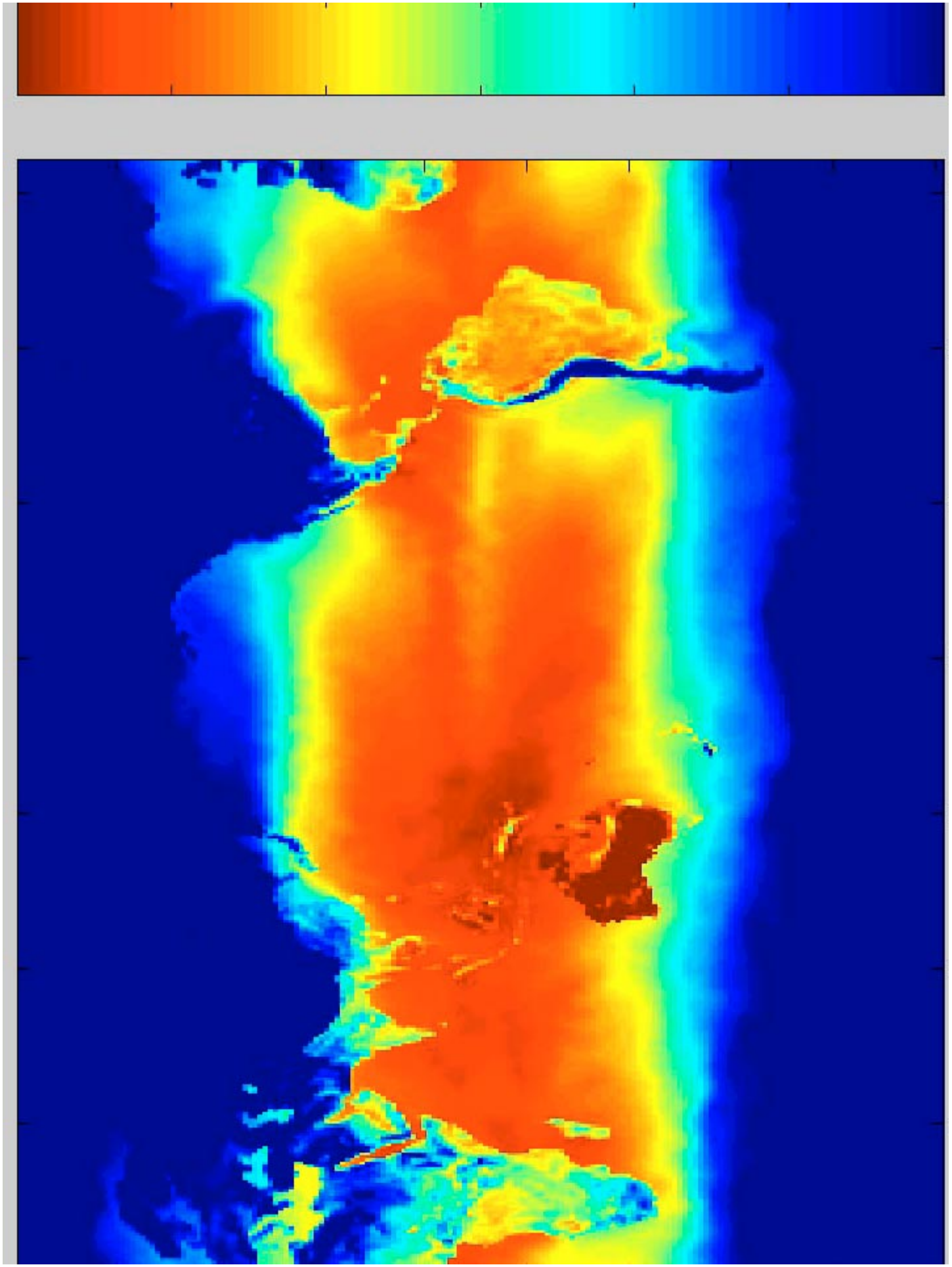
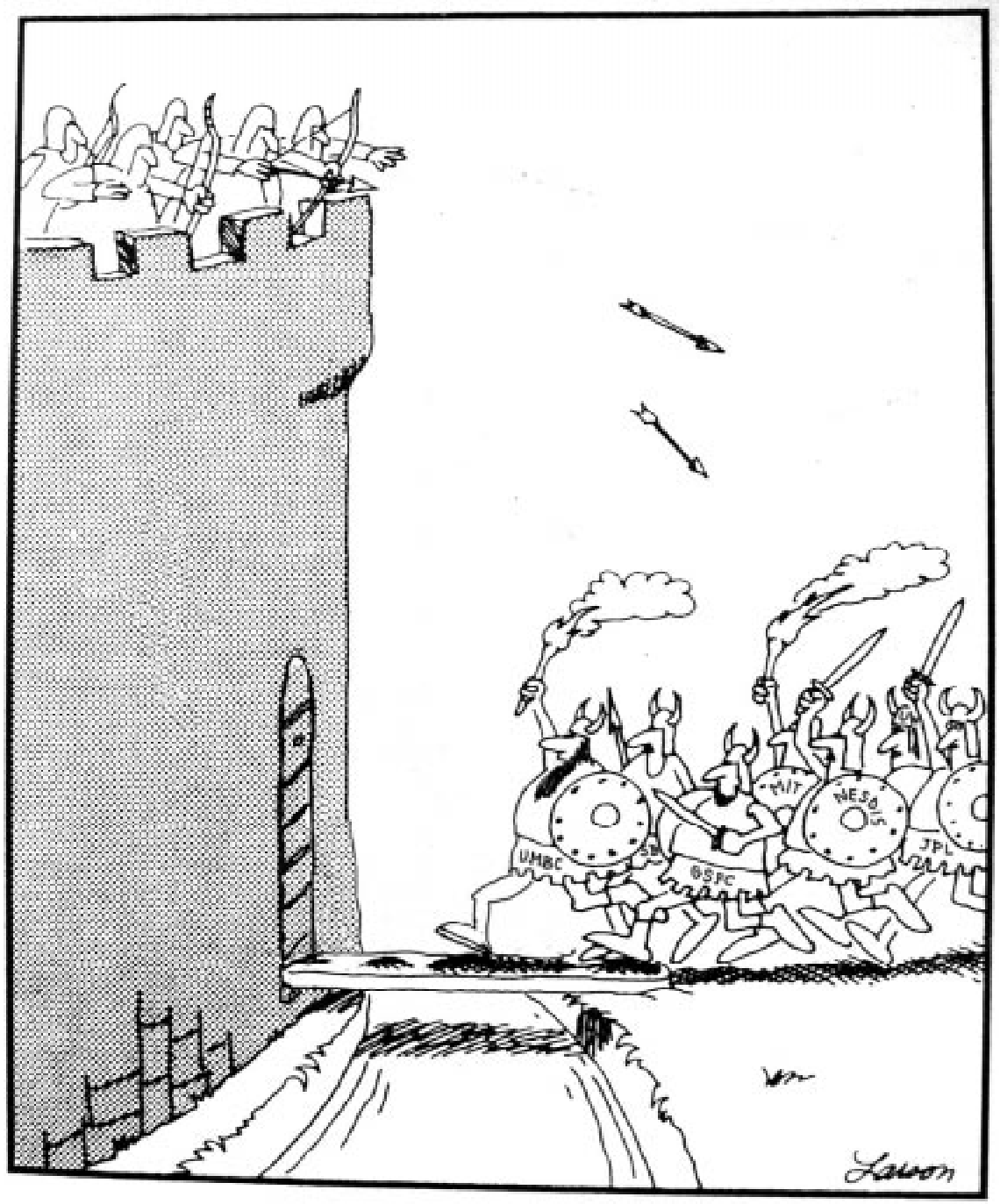




AIRS data, where are the AIRS data?

Status of AIRS

AIRS at TRW. Integration continuing

TVAC tests end of June 2001

Launch of EIS Aqua no sooner than 21 December 2001

Stable AIRS data not before 21 February 2002

Getting ready for AIRS data using simulated data

15 December 2000 NCEP analysis based level 1b data on alpha.jpl.nasa.gov/pub/public.

Action Items from the 6 December 2000 Workshop:

+ Put AIRS information on open web site
+ Put AIRS simulated data on public ftp site
+ Put AIRS channel properties on public web site
+ Get access to ECMWF analysis and 3 hour forecast
? Document how the simulation was done
? Define details of the BUFR file (QA flags?)

Focus of this workshop is

AIRS (Observed - Calculated)

AIRS data characteristics and flags

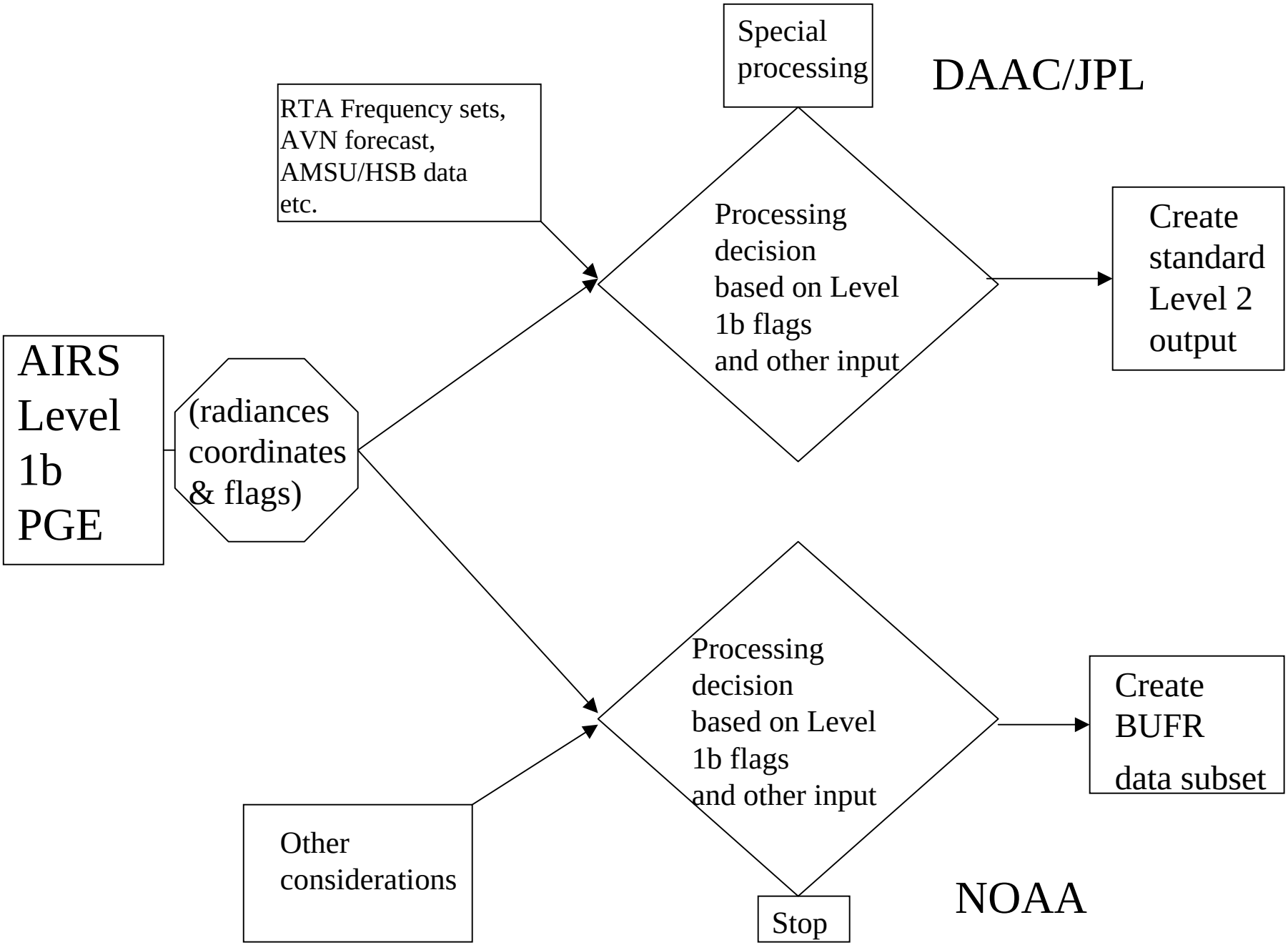
Presentations in four groups

1. Clear detection

2. (Observed - calculated).$_{\text{clear (ed)}}$

3. Data formats/quality flags

4. Methodology of assimilation
   (tangent model, data filtering)


Special processing
DAAC/JPL
RTA Frequency sets, AVN forecast, AMSU/HSB data etc.
Processing decision based on Level 1b flags and other input
Create standard Level 2 output
AIRS Level 1b PGE
(radiances coordinates & flags)
Processing decision based on Level 1b flags and other input
Create BUFR data subset
Other considerations
Stop
NOAA

Tom Pagano: Calibration accuracy and use of level 1b flags

Walter Wolf: The BUFR product definition. QA flags?

At the core of any assimilation or retrieval effort using AIRS/ AMSU/HSB data is some variant of a least squares formulation which minimizes the difference between radiance observed and radiances calculated based on some assessment of the physical state of the atmosphere T(p), q(p), T_surf, E_surf, etc.

$$\sum_i (I_{obs} - I_{calc})^2 / n^2 \rightarrow \min$$

n = standard deviation of *(Iobs - Icalc)*.

Without additional constraints are required to insure that the solution is unique and optimum.

Assimilation Methodology:

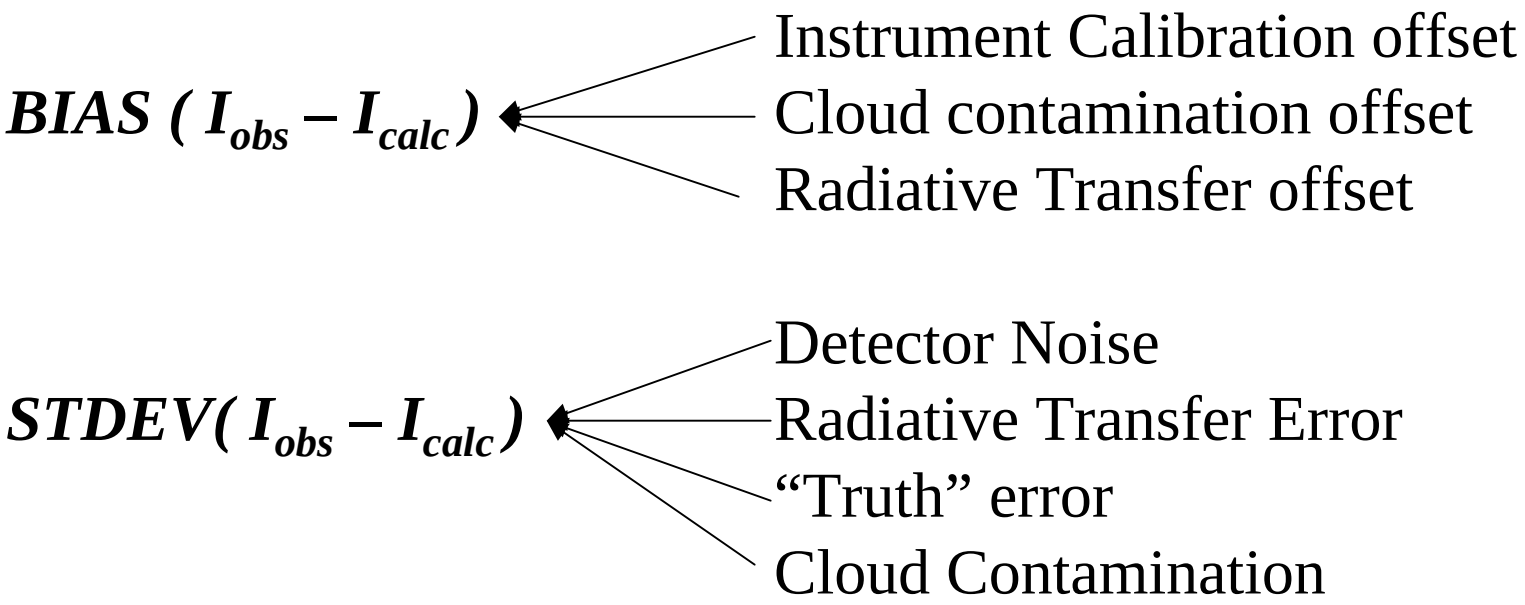
Andrew Collard: Status of AIRS radiance assimilation at the Met. Office.

Arlindo da Silva: DAO's next generation finite volume data assimilation system

E. Kalnay and M. Jin:
Efficient assimilation of AIRS using the "errors of the day".

Paul Van Delst: Status of Radiative Transfer Models at NOAA/NCEP.

The first effort of the AIRS team has to be to understand the statistical properties of $(I_{obs.clear} - I_{calc.clear})$ and to develop correction terms to insure that it has zero bias and gaussian noise.



Strow: Sources of error in "Calculated"

McMillin: (Measured.clear - Calculated) statistics,
sources of "truth" and correction equations

Joiner: DAO cloud-clearing, systematic error correction,
and cloud detection methodology results using TOVS data.

Topic #1. Clear detection.

Used by Assimilation team as data quality filter

Used by Level 2 retrieval team to

1. Verify radiometric calibration
2. estimate bias (obs - calc) and
3. train retrieval algorithm

Determining which AIRS footprints are clear enough to be directly useable is

1) a challenge. 1% missed cloud has same effect as 1% emissivity error at 10 microns: 1K T_surf error.

2) low yield.

Use of simulated data (where the “truth” is know) should be helpful to develop a good cloud filter.

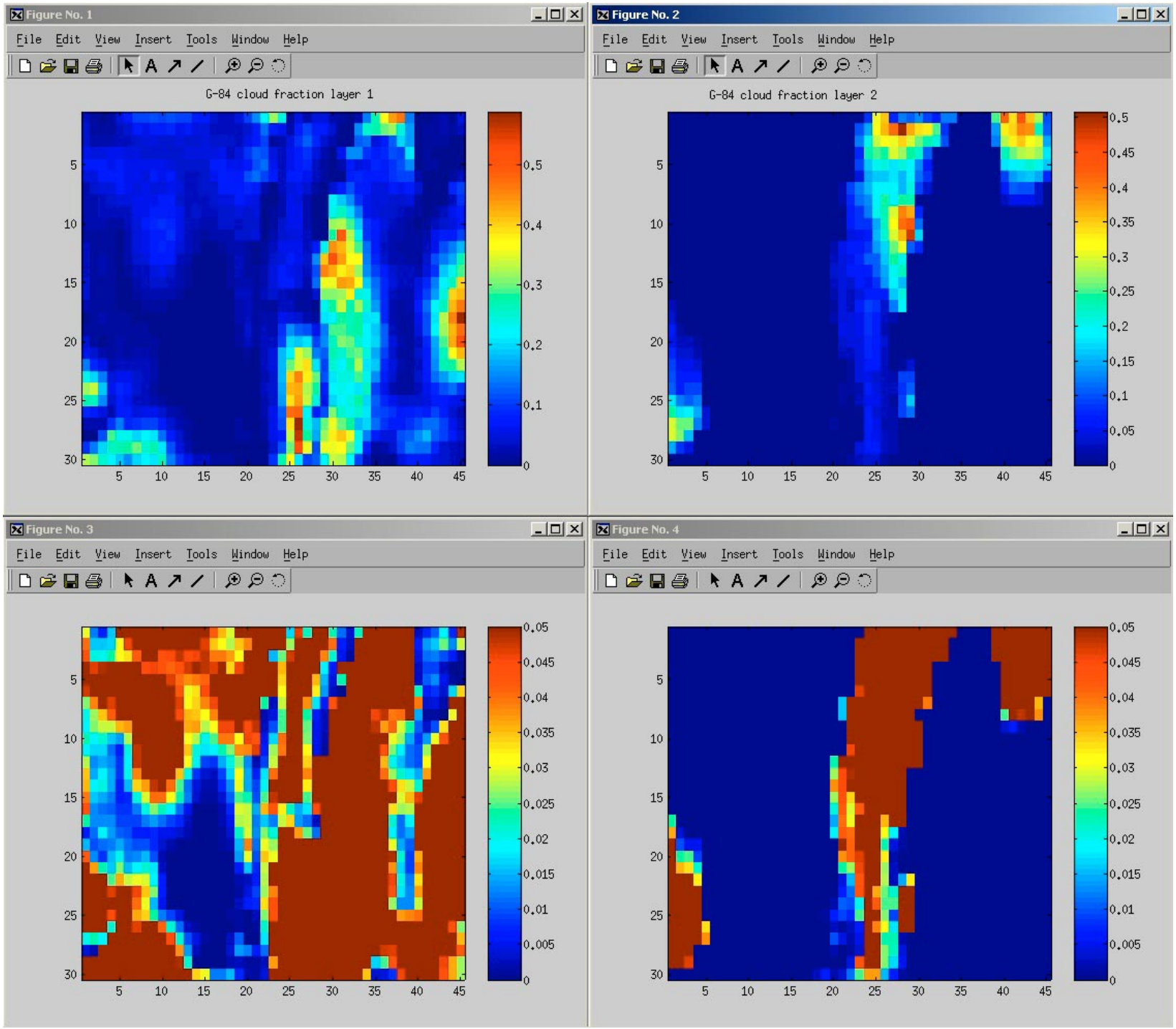


Figure No. 1
File Edit View Insert Tools Window Help
G-84 cloud fraction layer 1
Figure No. 2
File Edit View Insert Tools Window Help
G-84 cloud fraction layer 2
Figure No. 3
File Edit View Insert Tools Window Help
Figure No. 4
File Edit View Insert Tools Window Help

Goldberg: How to identify clear cases.

Susskind: AIRS detection of clear cases and results
for clear and near clear cases.

Gunson: (Measured.clear - Calculated) statistics from simulated data

Andrew Heidinger: Cloud Detection for AIRS
using NOAA 16 AVHRR?